

Genetic Diversity among Grapevine Viruses in the Pacific Northwest

ARS LOCATION:

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PRINCIPAL INVESTIGATOR:

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PROJECT OBJECTIVE:

Conduct genetic diversity studies among economically important grapevine viruses documented in the Pacific Northwest region

MAJOR ACCOMPLISHMENTS (2009–2010):

Genetic diversity among grapevine viruses:

The perennial nature of grapevines and the lack of selection pressure due to their clonal propagation and multiple infections over the years can result in a build-up of a mixture of several viruses and their sequence variants within a single infected grapevine. Analyzing the spectrum of viruses and their variants from different grapevine cultivars will improve our understanding of the sanitary status of vineyards and provide information for the development of better diagnostic tools and sound management practices that will lead to reduced spread and economic impact of several debilitating viruses and their variants. Using molecular biology approaches, we have documented the presence of genetically distinct variants of *Grapevine leafroll-associated virus 2* (GLRaV-2), *Grapevine rupestris stem pitting-associated virus* (GRSPaV) and *Grapevine fanleaf virus* (GFLV) in the Pacific Northwest (PNW) region as a consequence of introduction and subsequent dissemination of infected grapevine cuttings. A detailed assessment of the molecular diversity of field isolates of GLRaV-2, GRSPaV, and GFLV in the region provided a foundation for evaluating their role in the epidemiology of grapevine leafroll, rugose wood, and fanleaf diseases, respectively, and developing strategies to contain their spread via planting materials. From a practical point of view, the knowledge and resources generated in this study will offer improved capacity for the detection and discrimination of a broad range of virus variants that might escape antibody detection in clean plant programs. The project outputs have been incorporated in 'clean' plant programs and disseminated to various stakeholders through extension and outreach programs for increased awareness of viruses and their impacts on sustainability of the wine grape industry in the PNW region.

TECHNOLOGY TRANSFER/OUTREACH:

- Naidu, R.A. 2010. Podcasts on grapevine virus diseases at <http://wine.wsu.edu/virology/>.
- Mekuria, T. and Naidu, R.A. 2010. Genetically diverse isolates of Grapevine virus A are present in Washington vineyards. 2010 American Phytopathological Society Annual Meeting, August 7-11, 2010, Charlotte, NC. (Phytopathology 100: S81).
- Alabi, O.J., Mekuria, T.A., Jarugula, S., Gutha, L.R. and Naidu, R.A. 2010. Genetic diversity of grapevine viruses in own-rooted wine grape cultivars grown in Washington Vineyards. The 7th International Symposium on Cool Climate Viticulture and Enology, June 20-22, 2010, Seattle, Washington.

EXTERNAL SUPPORT:

- Viticulture Consortium-West
- The Washington Wine Commission's Wine Advisory Committee
- USDA-NIFA-Specialty Crop Research Initiative

COLLABORATOR:

Dr. Robert R. Martin, Research Plant Virologist, ARS, Corvallis, OR.

RECENT PUBLICATIONS:

- Jarugula, S., Alabi, O.J., Martin, R.R. and Naidu, R.A. 2010. Genetic variability of natural populations of *Grapevine leafroll-associated virus 2* in Pacific Northwest vineyards. *Phytopathology* 100:698-707.
- Alabi, O.J., Martin, R.R. and Naidu, R.A. 2010. Sequence diversity, population genetics and potential recombination events in *Grapevine rupestris stem pitting-associated virus* in Pacific Northwest Vineyards. *Journal of General Virology* 91: 265-276.
- Jarugula, S., Alabi, O.J., Martin, R.R. and Naidu, R.A. 2010. Genetic variability of natural populations of *Grapevine leafroll-associated virus-2* in Pacific Northwest vineyards. *Phytopathology* 100:698-707.
- Mekuria, T.A., Gutha, L.R., Martin, R.R. and Naidu, R.A. 2009. Genome diversity and intra- and interspecies recombination events in *Grapevine fanleaf virus*. *Phytopathology* 99:1394-1402.